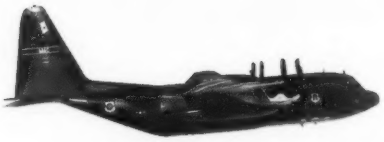
The MAC Flyer

APRIL 1979



Lightning Can Clip Your Wings ... page 21

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The MAC Flyer

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For Greater Safety and Efficiency
in MAC Air Operations

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A MAC Numbered Air Force commander passes on his views about flying safely.

Pilot . . . Commander

Major General Charles F. G. Kuyk, Jr.
Commander, 22d Air Force

At a Daedalian meeting not long ago, an elderly gentleman showed me his pilot's license. I was astonished to see that it had been signed by Orville Wright! It was a vivid reminder of how young aviation really is and of how far we've come in so few years.

The greatest change, of course, has been in the machines we fly. Those early aircraft were slow and fragile; their pilots could, and frequently did, walk away from a crash landing. Now we fly fast, complex, and extremely reliable airplanes. They rarely crash—but when they do, few people walk away.

There's another significant difference between accidents then and accidents now. We've engineered most of the dangers out of the machine itself, but the aviator is still essentially the basic "Mark-One, A-model" we started with. When we lose any large airplane today, the cause is much more likely to be human error than mechanical failure.

First, consider that all big cargo planes fall into pretty much the same group. They are multi-engine, which requires asymmetric thrust management. Two pilots are required. They have multiple, complex systems to the point that we assign a person to monitor them full time. Navigation systems became so demanding that a person was assigned to operate them. One or more loadmasters are needed for cargo and passenger handling. The complexity of our planes dictates a crew concept of operation which is tremendously different from flying solo. The size of the machines and crew operations allow for long crew days, 16 hours in most cases. We get fatigued from a long day, and compound it with time zone changes and successive days of flying. And with the responsiveness of our airlift system, your next landing might be at home station or an airfield you've never heard of.

We all fly essentially the same general kind of airplane. If a C-130, C-141, or C-5 has an accident, pay attention to the lessons to be learned. The smart crewmembers will look for the similarity of operation, and not write the report off as happening to somebody else in a different airplane. I personally read and heed any big-airplane accident report—bomber, tanker, cargo, or commercial. We all have the same kinds of problems. I pick out what is applicable and see if, through someone else's experience, I can avoid the same mistakes myself.

The other point to consider carefully is that you can only give 100 percent attention to one job at a time. If you're the pilot, your job is to control the aircraft in flight—maintain heading, altitude, airspeed, and configuration.

I haven't seen a pilot who can't do a great job of flying, *except* when he gets distracted. The more the distraction, the more the deviation. The more the interphone chatter, radio traffic, crowded airspace, weather hazards, system malfunctions (particularly asymmetric power or flight control), the more the deviation. Don't allow *anybody* or *anything* to divert your attention to the point where you can't fly the aircraft.

Aircraft commanders, by the nature of their dual-hatted job, are particularly susceptible. On one hand you are a commander and manager, while on the other, you are the pilot. It's a major responsibility and one laden with distractions. In fact, it can distract you to death. Set your priorities: a time to be the manager and a time to be the pilot. Get your manager duties over with—talk to the command post, gather information, brief the crew—then fly the aircraft. Especially fly the aircraft during the critical descent-approach-landing sequence. And don't let the unnecessary distractions sneak back in.

Our safety record has been excellent in big cargo airplanes; so excellent that we sometimes get complacent. But the price of error is catastrophic and we must counteract immediately the slightest relaxation of our high standards of airmanship.

Remember, it *can* happen to you or me—none of us is "too nice a guy" or "too talented" to be immune. But, there's a lot we can do about it and it's our own choice. As a pilot, I must strive to stop complacency from happening to me and, as a commander, I hope I have stimulated all of you to set high standards, stay alert, and fly safe.

Acci
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During 1978, Class A flight mishaps occurred at the rate of 1.37 for every 100,000 hours flown by MAC aircraft. This rate is a dramatic increase over 1977's rate of 0.8 Class A mishaps per 100,000 hours. Although MAC flew some 20,000 hours less in 1978, we experienced four more Class A flight mishaps than in 1977 for a total of ten.

Five Class B (over $50,000) mishaps occurred during 1978, bringing the total to 15.

Class A Mishaps

UH-1. The helicopter crew was attempting to follow a survivor's tracks in a snow-covered mountain valley when power required exceeded power available. The aircraft crashed into the trees, seriously injuring four on board.

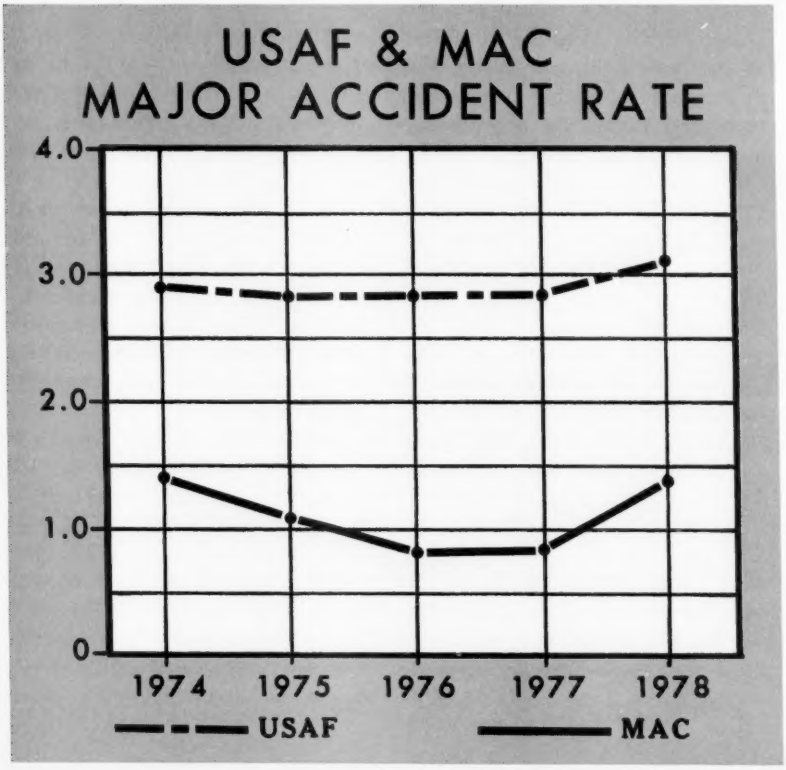
CT-39. An uninitiated landing gear retraction occurred during a touch-and-go. The crew escaped without injury.

C-130. The Hercules stalled and crashed while turning final during a night VFR approach to a remote strip. Three crewmembers were killed.

C-130. This fatal crash occurred as a result of the aircraft stalling during a visual approach to a remote airfield. Seven perished.

C-130. The aircraft commander's attempt to stop the airplane after the copilot's high and fast approach and long landing resulted in loss of control and substantial damage. There were no injuries.

C-130. As number three in a night formation, the aircraft impacted a ridgeline during a turning rejoin at low altitude. Eight crewmembers died.



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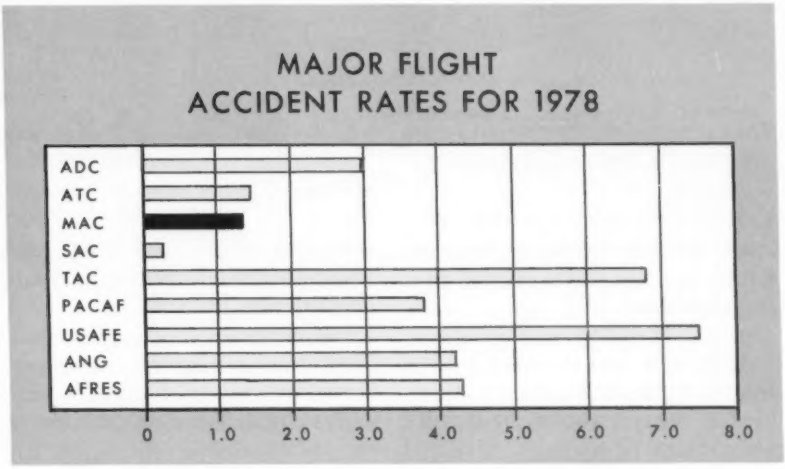


C-141. While taxiing out for takeoff, the pilot attempted to reposition the brake selector switch. His fingers slipped and his hand hit the landing gear lever. The gear lever down lock did not prevent the handle from moving and the main landing gear retracted causing major damage. There were no injuries.

C-5. A main bearing within number one engine failed on takeoff causing extensive damage to the engine and surrounding areas of the wing and fuselage. No injuries.

C-130. Lightning struck the Hercules ten feet inboard of the left wing tip, igniting the fuel-air mixture in number one fuel tank. The resulting explosion blew off 25 feet of the wing, and the aircraft impacted vertically at high speed killing six crewmembers.

C-130. Multiple emergencies resulted in the loss of power on both number one and two engines. The aircraft stalled while the pilot was attempting to return to the airfield for an emergency landing. Five crewmembers were lost.

Class B Mishaps (over $50,000)

H-1. The Huey crashed during a student training mission while practicing autorotations.

C-141. Maintenance personnel discovered a major structural component cracked due to a combination of stress corrosion and a harder-than-normal landing.

H-1. The helicopter was damaged while practicing slope takeoffs. The pilot was unable to successfully counter the dynamic rollover phenomenon.

C-5. Substantial damage to the Galaxy occurred when the aircrew allowed the wing tip and outboard

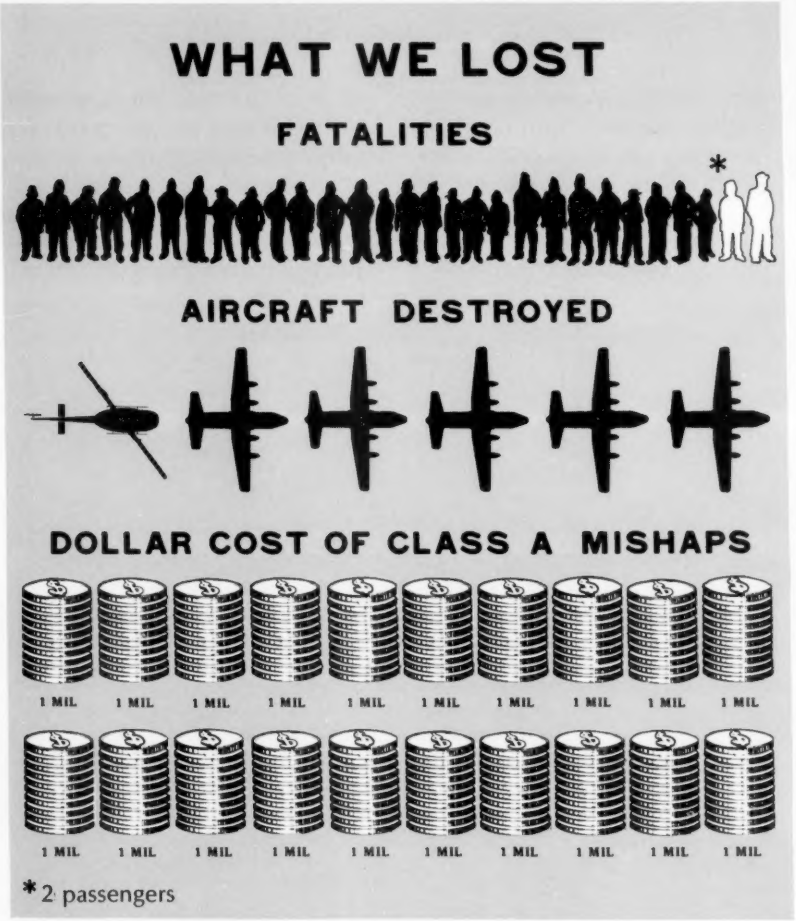
engine to contact the runway during a touch-and-go in gusty crosswinds.

C-5. Number two engine was damaged extensively by a hammer which was lost in the engine during maintenance.

•••

There are several ways to interpret these statistics. When we look at the accompanying graphs and compare our stats with the other major flying commands, we see our Class A mishap rate was the second lowest, with only SAC achieving lower. The MAC rate also compares favorably with overall USAF statistics.

But these encouraging comparisons don't reflect the true significance of our 1978 Class A mishap rate of 1.37 per 100,000 hours, which equates to a 75% increase over 1977. Viewing our statistics *only* in relation to other commands or the entire Air Force is like going through life with one eye closed—we lose all depth perception. Only by comparing *ourselves* to *ourselves* can we gain the perspective needed to change our behavior toward maintaining a safer flying environment.



CINCMAC Comments

I'm appalled—as I'm sure you are after reading this summary—at the loss of life, and the suffering and destruction accidents caused MAC last year. We can, and we must, do better.

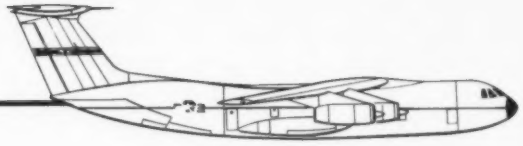
In 11 of these accidents, the critical factors were *peoples' mistakes*—lack of cockpit discipline, poor aircrew coordination, inadequate supervision, improper reaction, carelessness, unawareness, ignorance and apathy.

What's your attitude about your profession? Have you considered the downstream consequences to others of how you do your job? Or the impact on you from how others do theirs? Or to the mission from how we all do ours collectively?

Think before you act. Pause that split-second to question what might result from what you are about to do. If you don't *know* or don't *like* the possibilities, stop and get help. We cannot afford to waste our limited resources because of accidents we can prevent.

WILLIAM G. MOORE, JR.
General, USAF
Commander in Chief

Flight Lines



Back Cover Booster

Just wanted you to know how much I appreciated the back cover of the November issue of *TMF*. I'm an avid radio-control model flyer myself, as is one other observer in our unit. We had quite a chuckle over this cartoon.

Believe me, your cover isn't too far-fetched; I have seen scale R/C models of the C-141 and the 747 with wing spans of over 12 feet! Thanks for the laugh, and a great magazine.

Sgt W. C. Denny
Det 10, 7 WW
Muir AAF
Ft Indiantown Gap, Pennsylvania

★ Who was kidding? Seriously though, thanks for the good words.

TMF gets Hassled

Reference Maj Hassell's prize winning article, "Alone". I thought the account and lesson to be learned were excellent. However, as a Rescue HH-3E pilot at Keflavik and a member of the 67 ARRS that provides C-130s for SAR in this region, I regret that *The MAC Flyer* did not clearly indicate this was a fictitious story. The implication that two P.J.'s might be deployed and left abandoned in the North Atlantic before our HH-3Es were enroute is inaccurate; such a deployment is considered an "increased risk" mission requiring coordination with higher headquarters. I also consider the 67th ARRS's C-130 crews to be outstanding professional aircrewmembers who exercise good judgement and caution in an extremely challenging environment. While anyone may make a mistake, to leave your large readership with the impression we may have actually lost this aircraft is an injustice to some dedicated professionals.

Maj John B. McTasney
Det 14, 67th ARRS

★ Perhaps we should have noted the fact that "Alone" was a fictional account, but nobody at TMF or among the numerous "reviewers" we staffed the story through, felt that such a comment was needed. The important thing is that the story, as you point out, did deliver an important message in a dramatic way. In the future, however, we will identify fictional stories as such unless it is patently obvious.

Restoring a Globemaster

The C-124 is my favorite plane, having just recently finished restoring a C-model at Offutt AFB. I am very curious about its history, because as I examined the fuselage, I could see where the old SAC, MATS and AFRES markings were. About the only thing I know for sure is that it last saw duty at Carswell AFB. I would appreciate any information anyone has about this particular C-124; its serial number is 49-0258. If anyone has any old pictures of Globemasters, I would appreciate seeing them. I am presently building a model of the C-124 in 1/72 scale. I have completed a model of a MATS C-47 and my goal is to build all of the MATS/MAC airplanes. If anyone would like to donate old C-124 or C-74 flight manuals, checklists or C-124 unit patches for a display in a museum we're starting at Barksdale, I would be eternally grateful, but would be glad just to correspond with former C-124 jocks.

Gene Blythe
200 Ave C West
Barksdale AFB, Louisiana 71110

★ Sounds like some interesting and ambitious projects, Gene. Good luck.

Restored C-124C at Offut AFB, Nebraska.

Flyer Uses a Good Approach

Your fine article, "The last 300 Feet," by Capt Bruce Gumble, really rang my chimes. It pinpoints the danger inherent in every instrument approach. The *visual* portion of the final approach in low-visibility and low-light conditions is one of our most dangerous regimes of flight.

In my opinion, we have in the main failed to educate the pilot community to the real dangers found on final under these circumstances. (Your article is an outstanding exception.) Over the past six years the U.S. aviation community has lost every type of aircraft imaginable during visual portions of descents and approaches to landings in marginal visibility.

Two points stand out:

- It is very easy to exceed the eyeball's ability to interpret visual cues in low visibility or at night.
- Transition from instruments to visual reference under these conditions is a "bear" and extreme care is warranted.

Some solutions are apparent:

- Don't make visual approaches if precision instrument approaches are available.
- Don't make practice non-precision approaches in marginal visibility or at night—it can be fatal.
- Carefully set up crew training and procedures to forestall instrument to visual transition problems. (You fly the gauges, I look out the window and when we break out I take the aircraft and land visually—while you stay on the clocks—a procedure recommended by the Instrument Flight School five years ago!)

I began tracking instrument approach accidents in July of 1973. This visual-final-and-approach-in marginal-conditions problem has been responsible for more approach accidents than any other cause. Your article was bang-on!

Edward V. Coggins, Jr, Col, USAF
DCS/Air Traffic Services
HQ Strategic Communications Area (AFCS)
Offutt AFB, Nebraska

Capt Bruce Gumble's article, "The Last 300 Feet," was great and I'm sure it has prompted a lot of hangar talk among our pilots.

When I'm flying a PAR approach, I like to have the copilot talk to me all the way down. Not continuously of course, or I would miss some of the controller's instructions. When there is a break in transmissions though, I like to hear about what he's seeing *outside* the aircraft. For instance, can he see the ground, approach lights, or the runway? Are we going to break out shortly? What's our drift angle, ground speed (with INS)?

When we break out on short final, and I am looking outside the cockpit, I like the copilot to read aloud the *inside* indications. For example, "Land, airspeed 115, 113, 112, slightly high on the glide slope, (my backup ILS is working) 111, 110, 109, nice landing boss." The copilot serves as a verbal instrument indicator using short but frequent interphone transmissions. I can readily check any differences in my instruments compared to the copilot's and can make my threshold and touchdown speeds more accurate. By hearing the copilot talk, I know he is alive, well, and watching, compared to the silence that would occur if I was on my speeds all the way down.

Bruce's method will keep a pilot out of trouble, but I want more than that. I want to be on speed and on the glide slope!

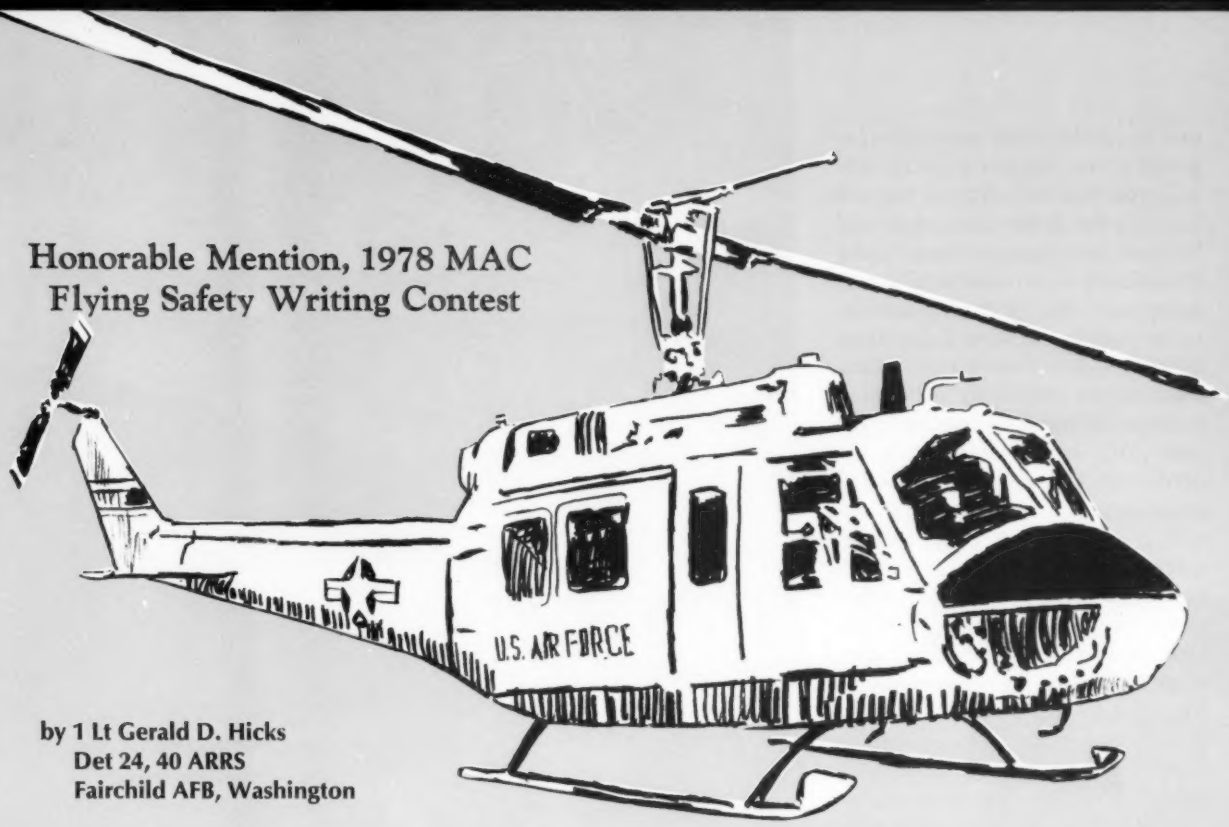
John D. Mielke, Lt Col, USAF
22AF/Assistant Director of Safety
Travis AFB, California

★ Bruce and the Flyer staffers thank you both for passing along your thoughts and kind words. By the way, brother Gumble is now back out in the "real world" getting a chance to put his TMF safety writing experience into actual practice as a C-141 driver at Travis.

We welcome letters from our readers and print all that space and good taste will allow. Send your letters to:

The Editor, *The MAC Flyer*
HQ MAC/IGFE
Scott AFB IL 62225

We'd like to have signed letters; however, we'll withhold the name at the author's request. Letters concerning controversial subjects are acceptable, but please address specific issues rather than personalities. We reserve the right to print letters whole or in part.



Honorable Mention, 1978 MAC Flying Safety Writing Contest

by 1 Lt Gerald D. Hicks
Det 24, 40 ARRS
Fairchild AFB, Washington

Here's a first-person story from a closed-mouth copilot who stayed quiet a moment too long.

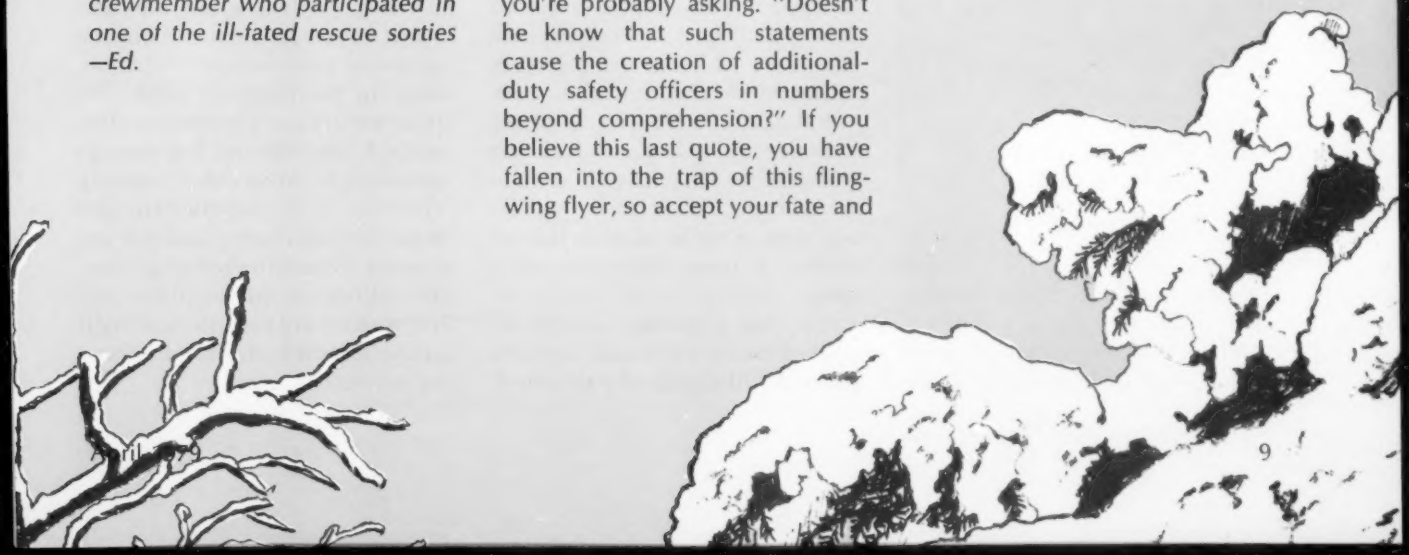
A Matter of Teamwork

By the time this SAR ended, five lives were lost, six people were injured and two of the rescue aircraft had crashed while searching for two downed light airplanes. This is a first person account by a crewmember who participated in one of the ill-fated rescue sorties —Ed.

Those of us in Uncle Sam's good old Air Force are in desperate need of more safety briefings, particularly on the subject of flying!

"What is this fool saying?" you're probably asking. "Doesn't he know that such statements cause the creation of additional-duty safety officers in numbers beyond comprehension?" If you believe this last quote, you have fallen into the trap of this fling-wing flyer, so accept your fate and read on.

To keep the record straight, statements like the one above are *not* responsible for our monthly safety briefings, volumes of safety



articles, and a fortune in resources being spent on safety programs. It is we, the members of the Air Force, who bring this perpetual flood of warnings, cautions, notes, etc., down on ourselves. Granted, flying on today's crowded airways or on low-level training scenarios entails a higher degree of risk than the average individual sitting at home is willing to consciously accept. Yet, have you ever wondered how much you contribute to increasing that risk level?

It is a rare, but enlightening, exercise to look back at a personal experience and examine what went wrong. Being one of the lucky few who have had a close encounter with the Grim Reaper and lived to talk about it, I subsequently placed a greater amount of emphasis on procedural knowledge, planning, and teamwork. One obvious point is that the last of that trio, teamwork, may often bring the risk back into acceptable limits when individual weaknesses are a factor. Those of us in the business of flying crew aircraft have more going for us with teamwork than you can imagine. Relating my experience should shed some light on this subject.

As a copilot on rescue helicopters, I've found that being called for a search and rescue mission (SAR) really sets the adrenalin flowing. However, there is a degree of confusion and excitement involved in a SAR that may create a tendency for even the best crewmembers to overlook, or if I may dare say so, "bend the rules" on occasion.

Our SAR was six days old, and normally the excitement of trying to locate a potential survivor would have worn off by that time. Unfortunately, during the fourth day, another light aircraft was lost, and on the fifth day a search aircraft crashed. The cloud of superstition surrounding these disappearances did not realistically take into account the rugged, snow-covered mountains and high winds in the area. Regardless of the cause of these additional mishaps, it was obvious that flying a SAR under such conditions was hazardous. My previous four days as copilot with another crew had been spent in some eye-opening situations while at the mercy of tricky winds and downdrafts. Attributing my fear to a lack of flying experience, I chose to lock the information away for a time when I could use it during a hangar flying session, or at least at the expense of some newer copilot's time.

On the sixth day, a survivor walked out of the woods and into the arms of a ground party. Back up the canyon somewhere lay his aircraft and another trapped survivor. We were called into the area, and shortly thereafter one of our scanners spotted tracks in the deep snow. Excitement began to build as we maneuvered up the canyon, following the tracks. It was an interesting situation, and I was keyed-up. At this point the scanners were doing their job, keeping the tracks in sight. The pilot was trying to maintain a slow enough airspeed and low enough altitude to keep the scanning effective while listening to the outside radio chatter and the important directions from the scanners. Then, of course, there was me, monitoring everything in sight inside the cockpit and remaining tight lipped as usual.

For those of you with many thousands of flying hours—and even those with many less—you may note a familiar blueprint for disaster starting to take shape. "How," you might ask "did *we* fail to recognize the obvious pattern of danger?"

For those of you that think you have the answer, there is the potential for an award for saving the Air Force the expense of safety officers. For those of us who are less gifted, we must fall back on teamwork to save us from becoming statistics.

Turning again to our rescue situation, between the two pilots on our chopper, one was reaching task saturation; and I, capable of recognizing the hazardous situation, sat by and watched in mute horror as a sudden shift in the winds created an uncontrollable descent into the trees. The result: one aircraft destroyed, four crewmembers with major injuries, and another item for the next safety briefing.

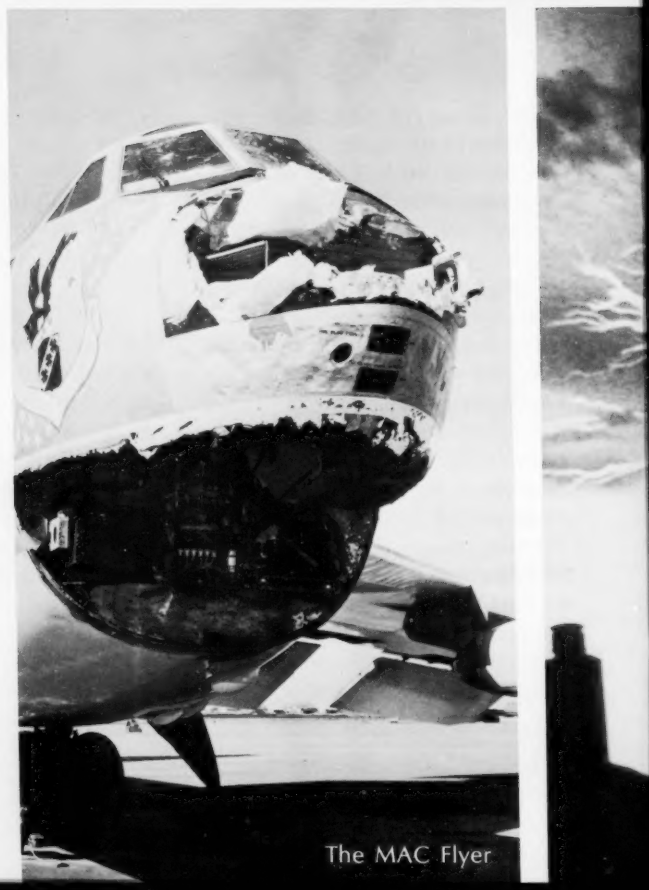
Later self examination and discussions with several highly respected flyers led me to the conclusion that I could have prevented our accident. Even more disheartening is the fact that aside from putting me in the copilot's seat to learn, the Air Force expected me to be competent enough to participate with the crew whose job was, in part, to keep the helicopter flying safely. For those wishing to pass judgement, I consider a plea of guilty to be appropriate. But what of the rest of you crewmembers out there? New people are entering the force each year and are being distributed world-wide to continue their training. Let me reemphasize that even the best of us have limits to our capabilities regardless of what we may think about ourselves. Given a scenario where the situation exceeds those capabilities, we have but two choices: fail disasterously or have other crewmembers take up the slack. The crew, by the same token, must be ready to accept the challenge at any time. The key: it's a matter of teamwork.

ABOUT THE AUTHOR

Lieutenant Hicks is a 1974 graduate of Indiana University where he was commissioned through ROTC. He completed his master's degree at the Newark College of Engineering in 1976 and went on to UHT at Fort Rucker, Alabama. After finishing advanced helicopter school at Kirtland AFB, he was assigned to Fairchild AFB, Washington, as a UH-1 pilot. He has over 1,000 hours in the Huey and is currently upgrading to instructor pilot.

THUNDER STORMS Are Killers

From 1974 through 1978 thunderstorms and associated phenomena (lightning, hail, wind gusts, etc.) did $27,512,761 damage to Air Force aircraft. Four aircraft (two from MAC) were destroyed and 24 crewmembers and passengers were killed.



The MAC Flyer

Water, water everywhere and they were headed for the drink. Join this C-7 crew as they

The very thought of crossing the cold Atlantic in a twin-engine aircraft may generate a little anxiety among those who routinely ply the NAT Tracks in four-engine transports. During Reforger '78, Air Force Reserve crews took their C-7s across the ocean without loss—but not without incident. Here's a first-person story about a Caribou crew whose troubles start 400 miles from land.—Ed.

I was the aircraft commander on one of six Caribous returning from Weisbaden AB, Germany, to the CONUS. Flying with me were Captain James R. Ballard, copilot and SSgt Jerry W. Roland, flight mechanic. We're all members of the 908 TAG (AFRES), Maxwell AFB, Alabama.

After stops at Torrejon AB, Spain, and Lajes AB, Azores, the stream of aircraft was on it's last overwater leg from Lajes to St. John's, Newfoundland—about nine hours flying time in a "Bou." Along with our C-7s were four C-123s and one HC-130 from the 303rd ARRS, March AFB, California—"Duckbutt" for the oil burners.

The first six hours of our flight were rather boring. Penetrating a weather front containing some light rain showers was the only excitement. The rest of the time the aircrews busied themselves with periodic "burnouts" to keep carbon from building up in the engines, transferring fuel from the ferry tanks to the wing tanks by use of the engine driven deicing pressure pumps, and idle chatter.

Our hours and hours of sheer boredom were finally punctuated by that proverbial moment of stark terror at 1438Z, when number one engine failed without warning. Immediate indications were severe engine vibrations, fluctuations of plus and minus 250 rpm and carburetor air temperature off scale hot.

I reached up and pulled back the number one throttle, hoping to allow operation of the engine, even if it meant it would be at a considerably lower power setting. The engine continued to vibrate and the rpm continued to fluctuate, so I ordered the engine shutdown and the propeller feathered.

The C-7 is not famous for it's single-engine capability. With the added weight of the ferry system and the extra fuel, our lame Caribou could not maintain altitude.

After completing the checklist items, I pushed power on number two up to METO power—that's "maximum except for takeoff" for you jet jocks. We held best single-engine climb speed, but the aircraft continued to descend. The only quickly jettisonable cargo on board was the crew's personal luggage, some extra engine oil, the aircraft chocks and some assorted maintenance equipment. The ferry tanks and extra fuel could not be dumped. Upon reaching 4,700 feet MSL, and before anything was tossed overboard, the aircraft stopped it's descent, much to our relief.

With the aircraft under control and flying, the next order of business was crew survival in case the other engine failed. We donned our "poopie suits" and LPUs, and fitted our parachutes. Movement inside the aircraft was cumbersome with all the survival gear on. We decided that our best chance for survival would be to ditch the aircraft rather than to bail out. Surface winds and ditching heading were supplied by the HC-130 which had joined up on us after the emergency began.

Being on one engine seemed bad enough, but we soon discovered an even more pressing problem: the de-icing pump on the right engine had failed. This meant that fuel could not be transferred from the ferry tanks to the wing tanks.

At the time of the failure we had less than three hours usable fuel in the wing tanks, but the rescue crew computed the flying time to St. John's at four hours. In their infinite wisdom, whoever designed the ferry system for the C-7 allowed for just such a contingency. As part of the ferry system each C-7 was supplied with a bicycle pump which allows the crew to manually—and I mean *manually*—pressurize the ferry tanks and pump fuel to the wings. The pump was hooked up to the system and the flight mechanic started pumping. It seemed like an eternity before the fuel gauge started to increase. In a couple

attempt a...

Single-Engine Safe Crossing

by Maj Ronald K. Peacock
357 TAS (AFRES)
Maxwell AFB, Alabama

of minutes, we knew that the fuel could be pumped faster than the engine could use it. For the next hour and 45 minutes each of us took a turn on the bicycle pump until enough gas was pumped into the wings to insure our flight could be completed.

With the airplane flying, enough gas available for the remainder of the journey, and a plan ready should the worst happen, we relaxed as much as possible under the circumstances. Remaining concern centered on our only operating engine. We were well aware that on the trip to Germany, the crew that had ferried this particular aircraft had made two precautionary landings because of problems with the right engine.

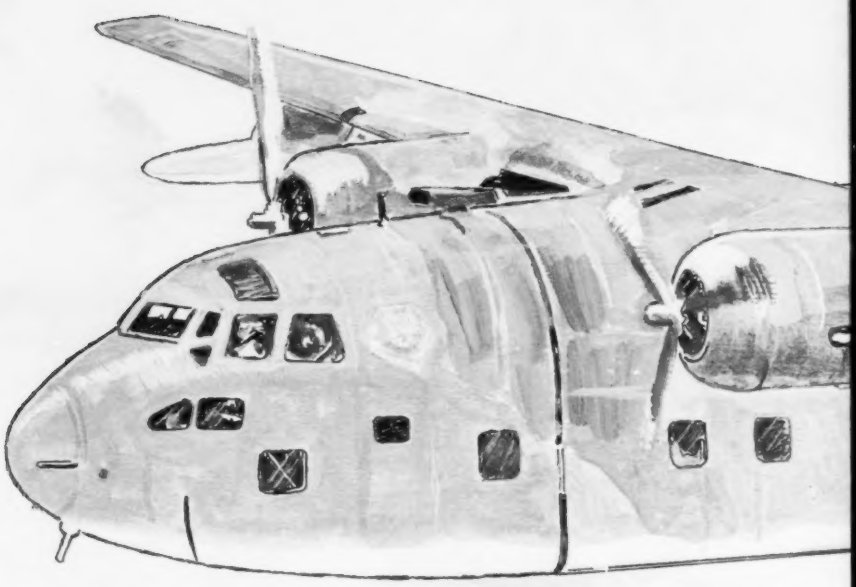
As time passed, albeit slowly, and more fuel was burned off, I was able to reduce the power setting on number two. This, of course, reduced the fuel consumption and meant the engine wasn't having to work quite as hard—a small but significant advantage.

When we spotted St. John's some 75 miles out, (obviously the Newfoundlanders haven't invented air pollution yet) our spirits started to climb, and were soaring when we touched down "without further incident." Not many people would have believed it, but we walked away from our crippled Caribou after flying for four hours on one engine. I felt a lot of new-found respect for the old C-7 and it's single-engine capability that day.

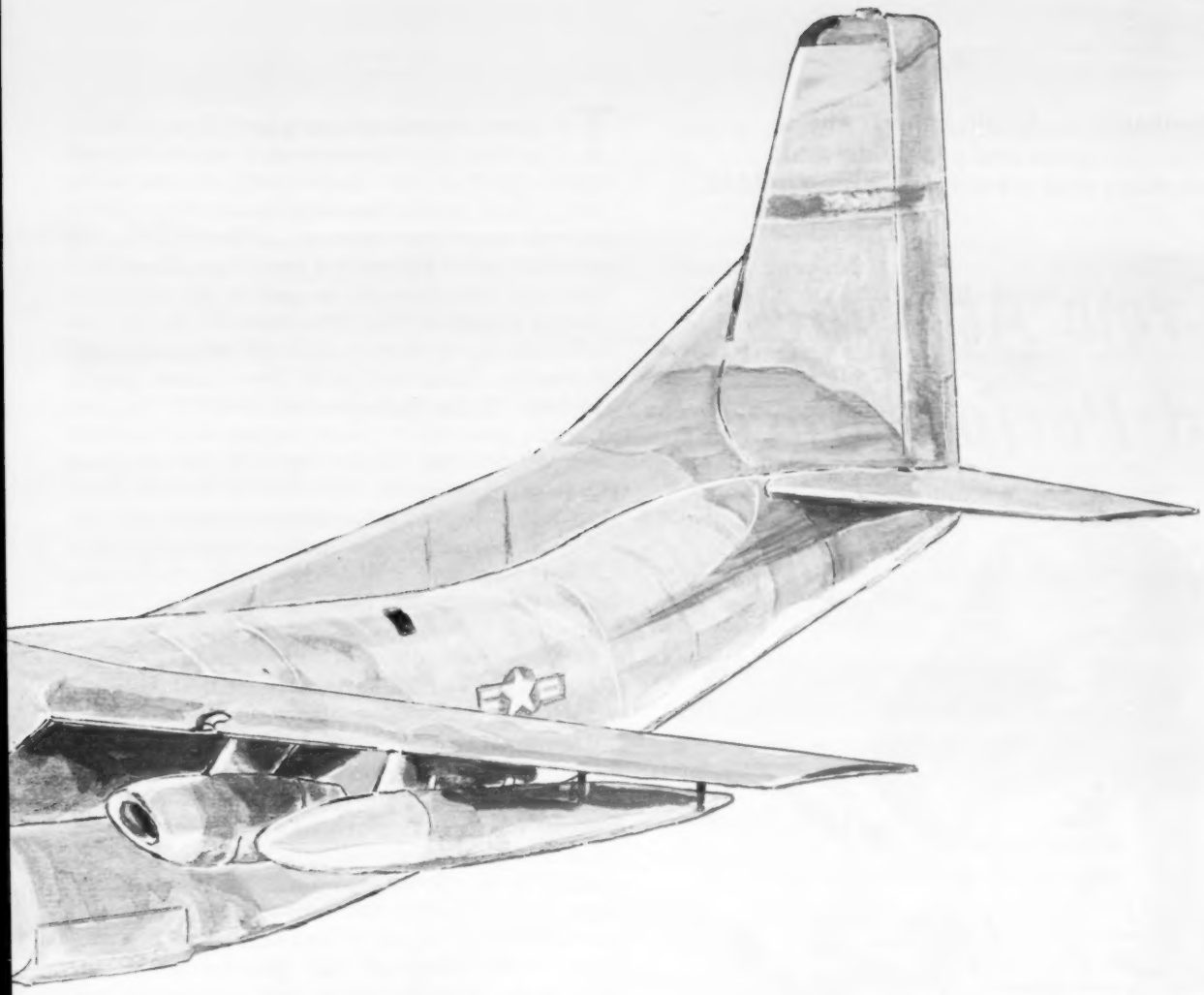
Many of the crews from the other C-7s and 123s were waiting for us. It was awfully hard to tell who was happier to see whom. The camaraderie that had grown among the crews during the month-long exercise manifested itself in the genuine concern that the other airmen showed during our ordeal.

The "Newfies" kept the town open all night and a goodly portion of the next morning while all the aircrew and maintenance people that had been a part of the 14th Air Force (AFRES) contribution to Reforger '78 celebrated the "safe" crossing.

The Airlift Legacy



C-123K Provider



B.GAUSS-1979

The C-123 started as a powered version of an all-metal glider. Built by Chase Aircraft, the prototype XC-123 Avitruc first flew on 14 October 1949. In 1951, the Air Force contracted for five production C-123Bs which Chase built and flew. However, the project faltered when the company changed owners and the USAF cancelled its order for 300 airplanes.

Fairchild took over the five C-123s, redesignated them Providers, and added the large dorsal fin. Subsequently, Fairchild supplied the Air Force with 300 C-123Bs, the first going to the 309th Troop Carrier Group, Troop Carrier Command, in July 1955. The Provider was saved from early retirement in 1961 by the call for tactical airlift in Vietnam. By 1964, four C-123 squadrons were airlifting men and supplies in support of American and South Vietnamese operations.

C-123Ks began appearing in late 1966. Their STOL capabilities were improved by adding J-85-GE-17 turbojets in pods under the wings to help two Pratt & Whitney R-2800-99Ws get the 60,000-pound airplane off the ground in less than 1,200 feet. Larger wheels and tires, and antiskid brakes allowed the Provider to operate into strips less than 2,500 feet long.

The C-123's joined MAC in 1974 when the command acquired Provider-equipped Air Force Reserve Squadrons. Most recently, these units flew the venerable airlifters across the Atlantic to participate in Reforger '78. Attesting to the quality of the airplane and the skill of the crews, the crossings were accident free.

A seasoned airline captain analyzes his profession's progress and problems, and identifies many that are similar to ours in MAC.

Crew Attitudes and Performance

by Captain R. C. Gerber
Regional Vice President
International Federation of Air Line Pilot Associations

The views expressed here reflect 35 years of airline flying as a crewmember. I have had considerable opportunity to observe and participate in the whole flight crew experience—its benefits, glories, frustrations, disappointments, achievements, and yes, its disasters. During that time I have been privileged, as many have, to be part of the birth and startling growth of the airline industry from the days of 85-mph flying boats to the 1,400-mph supersonic all-weather flying era; from the 12-man operating crew, to the three-man complement. Yes, you read me correctly—12 flight operations crewmembers. We marched in full uniform, double file, from the terminal, down the ramp, and aboard our flying boat in full view of passengers and spectators, and marched off again at termination. Some of my first copilot training was in "close-order drill." Unbelievable today, and just one outward indication of the tremendous changes over the years in flight crew duties, attitudes, and performance.

Even more startling has been the technological explosion which produced the superbly engineered aircraft we now fly. When I was hired in 1942, three Sikorsky S-42 flying boats were part of my airline's fleet. They were the survivors of 15 purchased less than 10 years before. Such an attrition rate would be unthinkable today. After transitioning from the Constellation to the DC-6, I was so impressed by the improved engine reliability—not a failure in the first six months—that I checked back in my log book and found I had experienced 42 engine failures in five years on the "Connie." That's over eight per year or almost one for every month I actually flew. In 10 years on the B-707 I had only two engine shutdowns, one of those was a precautionary, not a failure. In seven years on the B-747, I have had just one. That is progress. Add the improvements in ATC, airports, instrumentation, etc., and you have a steadily improving over-all safety record achieved in the past few decades.

But one thing has not changed, the same human is still sitting in the cockpit. He now has over a thousand instruments, levers, dials, lights, bells, circuit breakers, radios, masks, and assorted equipment instead of the old 50 or 60 items. The aircraft is now moving at eight or nine miles per minute instead of one and one-half. And worst of all, there are now thousands of other aircraft in the sky he once inhabited almost alone. Day/VFR has now become 700 feet visibility with a 50-foot decision height.

While today's aircraft are superbly engineered, we can't always make the same claim for the people who fly them. Unfortunately, nature did not design the perfect human. As a result, we've tried to compensate for those weaknesses with rules and procedures. Some of them are unrealistic. There are fears today that technology has outstripped man's span of control. The man-machine interface is slipping. As a result, the human occasionally becomes overloaded sometimes to the extent that he is a primary accident cause himself. We add systems, and systems to back up the systems. While nature has not designed failsafe men, neither has man designed failsafe systems. If machines fail in flight, in almost all cases it is the human who compensates for the mechanical malfunction. Man will continue to be the ultimate backup to the machine.

The gap between man and his machine has widened, while technology, once his friend, may have become a mortal enemy. Yet, no one really has developed standards of maximum intake for the human mind. Just how much can a person absorb and still maintain a reserve of capability for the unexpected or unusual situation? There are, in fact, no such standards and the reason is that no two people have been designed precisely alike.

Men do make mistakes. Human frailty in aviation accidents, however, is most often due to faulty transfer of basic information or its misinterpretation. Two aircraft collide on an active runway. "Tenerife," you say immediately, but also Chicago and Boston in the last few years. These accidents, it was said, could not happen, but they did. Somebody misunderstood his clearance. Somebody didn't have all the information he should have had—or he became confused over what he did have. Too frequently, the problem is one of information transfer.

Under normal circumstances, the human mind copes well with day-to-day flying, with bad weather, short runways, equipment malfunctions, out-of-service navaids, and other abnormal conditions. But the mind can be overloaded. Decisions are the prime stock-in-trade of pilots. The quality of any decision is usually a direct reflection of the quality of information upon which it is based. The recent trend has been to remove the pilot further from the information loop. Regulatory agencies and airline managements seem to continue to place more authority in the hands of ground-based people and their mechanical systems—sometimes to the detriment of flight safety. Removal of the pilot from the information and decision-making process causes many slippages in the system and the level of safety is reduced proportionally.

Besides pilot-machine interface problems, we have the accompanying difficulty of fitting these larger, faster, high-performance, sweptwing aircraft into the physical airport environment. Again, the flight crew is in the hot spot. Major improvements in airports have resulted since the introduction of jets, but the accident statistics show over 75% of accidents occur on or within 3,000 feet of runways—the vast majority during approach and landing. Obviously something is wrong. We are suddenly all intensely aware of wind shear after a whole series of accidents blamed on this phenomena, but wind shear is not new—it has always been there. It simply did not affect the performance of the slow, straight-wing aircraft as critically. Intensive research is under way to better identify conditions conducive to wind shear, to measure it, and warn pilots, but for now about the best anyone can say is, "Watch out!" We are grateful for that.

Man will continue to be the ultimate backup to the machine.

What I find inexcusable are the known hazards, with known solutions, that go uncorrected. Three glaring examples are approach aids, runway surface conditions, and hazardous overrun and underrun areas. Every runway used by commercial airliners should be equipped with precision approach aids. Why? Worldwide accident statistics show that for each precision approach accident, nine accidents involving nonprecision approaches occur. It appears that many otherwise knowledgeable people in the aviation community are generally unaware of the variety of problems faced by pilots who must execute a nonprecision approach to a runway that lacks even visual glide path assistance (VASI). This problem becomes considerably more acute during darkness and/or limited visibility. Simulator studies performed by Kraft and Elworth describe attempts to assess pilot accuracy potential during clear-night visual

approach conditions into a "black hole" approach area (no ground lighting). Twelve test pilots from one of our largest airframe manufacturers participated. Only airspeed and rate of climb/descent information was provided (no altimeter). Participating pilots generally thought it would be relatively easy to accomplish this task. They all had an average of 10,000 hours or more. The results bore out conclusively what airline pilots have known for years: "A nonprecision approach is, indeed, an imprecise approach." Eleven of the 12 test pilots "crashed" the simulator.

There are other "correctable" airport hazards: ditches, highways, dikes, and assorted "pill boxes" of astounding variety that exist in proximity to the ends of many runways. If these were removed, an aircraft might sink down to its vertical fin in mud but at least it wouldn't end up like the B-747 at St. Thomas.

The crewmembers may volunteer what they want to say, but you must solicit what you want to know.

What's the solution, relief, or recourse? How can we best cope with these new and old problems in the present environment? There may be some help through technology but mainly the solutions will be through human effort by those in the industry who know the problems and seek reasonable and mutually acceptable solutions. In the human factors area, more and more accident investigation agencies are increasingly aware that to ignore this aspect is to miss the real cause of many accidents and incidents—and the prevention we all seek so avidly.

I stated earlier that air traffic control and information transfer in high-density areas may be the number one human factors problem. NASA is focusing sharply on a number of excellent displays combining raw data inputs into simplified readouts. Vertical and horizontal situation displays could help in collision avoidance; engine displays could reduce cockpit workload; master monitor displays could consolidate a number of pilot functions. Some of the mock-ups bear little resemblance to present cockpits. However, until the black boxes bring relief, we humans must solve our own human factors problems.

One way is with thorough and realistic training of crews. This is one area of truly astounding change since the B-747 was introduced. It was undoubtedly the finest pilot training program I ever had and resulted in extensive revision of training concepts on most other aircraft as well.

Besides training, better utilization of crew skills in the cockpit can minimize individual workload and provide maximum efficiency. The name of the game is "crew concept." The old one-man-band idea is not for modern jet airliners. It takes the full crew, each knowing his job and his fellow crewmembers' jobs and performing his duties precisely and unfailingly to provide the margins we need for unexpected emergencies or malfunctions. Normal operations must be handled with great ease and confidence because when things begin to go wrong and the workload skyrockets, each man must know precisely what is expected of him.

Realistic duty times are essential—they can't be based on the ultimate human fatigue factors, because even the best trained pilot cannot cope with unusual or abnormal workloads if he's at the outer limits of endurance. This is a highly controversial area with many variable factors, but certainly it is no mystery what makes people tired, particularly pilots. The time of departure, number of en route stops, workload caused by traffic, weather, cockpit duties, and general working environment all contribute. Reasonable duty limits are an essential safety ingredient.

I have spoken of many problems—a distressing number. And of some solutions—many attainable. You may have recognized a common thread running throughout—the difficulty of information transfer and the dire consequences of failure.

Do we realize what a gold mine of information is out there—with a little digging? Flight crews see the end product of all the airlines's effort that goes into carrying passengers between two points. Are any of them reporting on how well or poorly the job is done, and most important, suggesting ways of doing it better? Why not get this little bonus? Sure, some comments will be facetious, perhaps silly or self-serving, but an intelligent management should be able to separate the wheat from the chaff and harvest a valuable store of information. One suggestion: the crewmember will volunteer what he wants to say, but you must solicit what you want to know. It is a real challenge but the rewards in "good will" alone can be enormous.

And finally, pilots, airport managers, airframe manufacturers, regulatory agencies, and airline management all have a moral and ethical responsibility within the system. If any portion of any group reneges on its responsibility, sooner or later some passenger(s) will pay the price.

—Adapted from USAF *Safety Officer's Study Kit*

Accidently engaging in one of nature's high voltage light shows can be fatal. Here are some hints on staying safely in the audience.

Along with the usual seasonal exhortations about thunderstorms we have a new one to offer: "And further more, lightning can ignite the vapors in your fuel tanks!" That may seem a little far-fetched, but it has happened to two F-4s and a KC-135 in recent years. Now a MAC C-130 joins this select group, bringing home the awesome reality of a catastrophic lightning strike.

The Hercules crew was on a round-robin training mission. While working near a base in the Southern U.S., they were instructed to divert to an East Coast station. There they would pick up a crew which had ferried another C-130 in for maintenance earlier that day. The crew changed their flight plan destination with ATC and checked the weather with metro. A stationary front was generating fog and kicking off showers throughout the Southeast.

About 30 minutes out of their destination, center cleared the 130 crew to descend to 9,000 feet. Approaching 14,000 feet they requested a level off for about 10 miles to get around some weather; center agreed. The Herk was now flying in precipitation, 1,000 feet above the freezing level and experiencing some turbulence. When the pilot asked ATC if they were painting any weather on their scopes, the controller replied that he showed heavy weather all around the crew's destination airfield.

A few seconds later the Hercules pilot reported a lightning strike to a fuel tank. Thirty seconds after the strike, he declared an emergency for control problems. The controller instructed

him to squawk 7700 and issued a heading and altitude clearance. For nearly a minute the controller watched the C-130's electronic blip move straight across the scope; the altitude readout remained constant. As the flyers wrestled with the Hercules, they requested a vector to a clear area to work out some control problems. Suddenly the altitude readout began to show a descent.

Seconds later the controller watched helplessly as the target appeared to stand still on the scope. Radio and radar contact were lost. The C-130 crashed in an unpopulated area and all aboard were killed.

Wreckage analysis revealed that the bolt of lightning initially hit the C-130's left wing about ten feet inboard from the tip. The lightning then hopped along the wing, attaching itself at nine different spots. Damage to the wing ranged from paint discoloration to a hole actually burned through the aluminum skin.

Once the lightning burned through the upper surface of the wing, it acted like a spark plug in the outboard fuel tank. The resulting explosion blew off the upper and lower wing panels. Deprived of fuel, the number one engine flamed out. To combat the loss of lift on the left wing and the asymmetric power, the pilot used aileron, but the weakened outboard wing structure couldn't stand the stress and failed. The outboard 25 feet of the left wing broke off and maintaining control became impossible. Intriguing as the details of the strike may be, the weather conditions the unfortunate Herk was flying in when it happened are perhaps more significant.

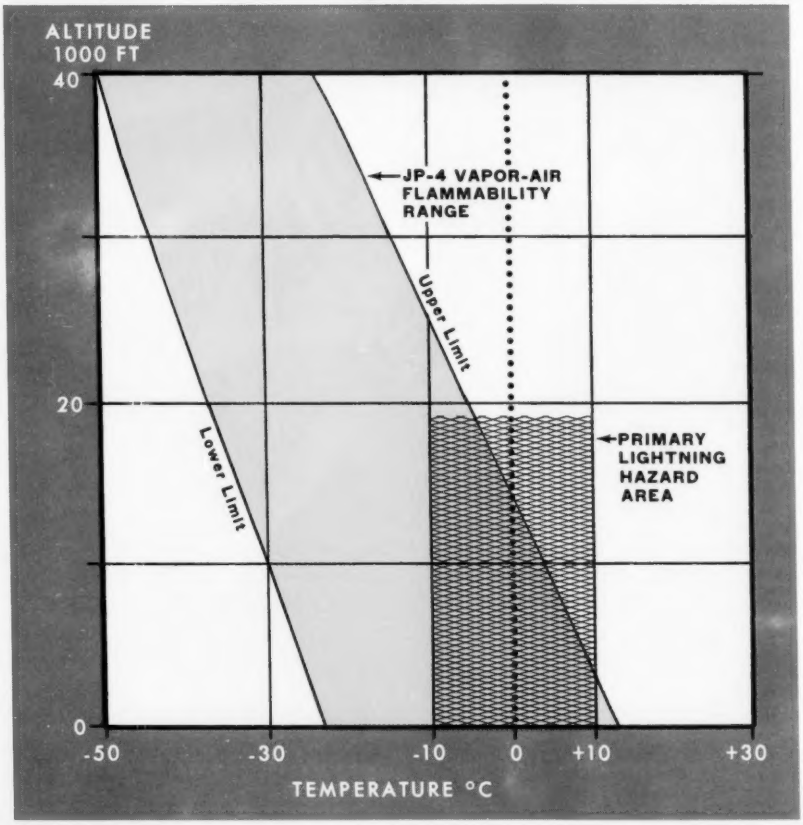
The chances of a lightning bolt striking an aircraft ten feet inboard of the wingtip are one in 10,000. However, a recent study reveals that 80% of reported lightning strikes occurred when the aircraft were in the clouds, in precipitation, experiencing some turbulence, and operating within eight-degrees Celcius of the freezing level (±8°C). Thunderstorms are not required for lightning strikes, but their existence should alert the crew to the increased possibility of a strike. In this case, the Hercules was attempting to avoid a heavy rain shower with cloud tops estimated to be above 25,000 feet. Such a rain shower definitely has the potential for lightning.

The story of the C-130 ends here, but to fulfill our goal of mishap prevention we would like to pass on more information about how lightning works and what you can do to reduce the chances of a bolt of it striking your aircraft.

How It Works

In simple terms, a lightning stroke is a long electrical spark between charge centers. A charge center may be located on the ground or within several areas of a cloud. Discharges can occur between the cloud and the ground, between different clouds, or within the same cloud. Several theories exist as to how clouds become charged, but most agree that vertical movement of water droplets and ice crystals within the clouds cause parts of the cloud to develop positive or negative charge centers. The main negative charge center will be near the minus-five-degrees Celcius level; the main positive charge center will be near the minus-20-degrees Celcius level. There's also a secondary positive charge center near the zero-de-

Figure 1.



gree level.

When the charge center is strong enough, its electrical field begins to ionize the air in and around the cloud. The air becomes an electrical conductor and the first spark starts to jump from the negative charge center in search of a positive charge. This first spark is called a stepped leader and it zig-zags through the air at about 100,000 metres per second. As the stepped leader approaches a positive charge center, usually a tall and pointed object on the ground, it begins to attract the earth's positive electrical charge. Pulled by the stepped leader, streamers go out from the positive charge center toward the stepped leader. When they meet, a path of continuity is created and the positive charge rapidly flows toward the negative charge center. Thus far the whole process has taken only a few thousandths of a second! The positive charge moves up the channel of ionized air at about 100-million metres per second, creating a current that may reach 200,000 amperes. This supersonic return stroke causes the bright light and loud bang associated with lightning.

If the cloud is highly charged, a series of strokes may pass through the conductive channel and the successive lightning flashes may last for as long as a full second.

Why Airplanes?

When the stepped leader leaves the charge center, it's "seeking" a path of least resistance to an opposite charge. If your aircraft is nearby, it may generate positive-charge streamers that link with the stepped leader. The charge will then flow into the aircraft. Relative to a storm's charge center an airplane can carry only a small charge, so the stepped leader usually continues through the airplane and seeks a stronger positive charge center.

The aircraft becomes a link in the electrical circuit and remains in its clutches until the lightning dies out naturally. There will always be a point of entry and exit from the airframe. Most frequently, the strikes hit the extremities of the airplane (wingtips, radomes, etc.) and in newer designs these areas have been strengthened to withstand a lightning strike. As the aircraft continues its forward movement the lightning bolt may reattach itself to the aircraft several times, as it did in the C-130 mishap.

Lightning Damage

When a 200,000-amp electrical current passes through an aircraft it has to have some undesirable effects. Fortunately, these are usually limited to pitting and scarring of the aircraft skin where the lightning bolt enters and departs the aircraft. Radomes may be disintegrated by the explosive expansion of the air inside as the lightning stroke reaches for the metalic radar dish. Lightning may also find its way into the aircraft electrical system by striking surface mounted antennas or lights. In these cases, you can expect popped circuit breakers, blown fuses, burned wiring, ruined equipment, or even total electrical failure.

Fuel Tank Explosion

Figure 1 shows that JP-4 is well within its flammability range most of the time that the airplane is in the temperature and pressure conditions which are ideal for a lightning strike. Lightning can ignite fuel vapor by burning through the tank skin, and arcing into the tank. It can also explode a tank by inducing overvoltages in fuel level probes, or heating the skin of the aircraft to a spot temperature above the flash point of JP-4.

Other Effects

In addition to the possible direct effects of lightning, some indirect effects may make the airplane hazardous to operate after a strike. Ferrous metals in the airplane can be magnetized, rendering compass systems unreliable. Spurious electrical impulses can be sent through electronic flight control and navigation systems, making their accuracy questionable.

An additional effect of lightning is the way the pilot reacts. Apart from the initial fright which may render the flyer somewhat useless for a few seconds, it can also temporarily blind him. It's even possible to get a mild electric shock, but crewmembers are normally in no danger of being electrocuted.

Preventing Hits

The key to prevention is avoiding conditions conducive to lightning strikes. Statistically 80% of all lightning strikes happened when the aircraft were within eight-degrees Celcius of the freezing level, in the clouds, in precipitation, and experiencing turbulence. You can reduce your chances of taking a strike by planning your route and flight level around, above or below the prime strike conditions. During departures, arrivals and holding, don't loiter near the freezing level. When thunderstorms or heavy rain showers exist, give them a wide berth. (The only difference between a thunderstorm and a heavy rain shower could be that first stroke of lightning.) During 1978, 46 Air Force aircraft were struck by lightning—one strike was a killer.

Mariscal Sucre Airport

Quito, Ecuador

(Elevation 9,226 feet)

*Deja Vu**

*(day-zha-voo), [Fr. lit., already seen], the illusion that one has previously had a given experience.

Named after a famous South American liberator, Mariscal Antonio Jose de Sucre, this airport is near the northern edge of Ecuador's capital city, Quito. The lofty Andes Mountains are the main hazard to air operations into the field. Within 35 miles, numerous peaks top 15,000 feet MSL. The closest high terrain is easily seen from the airport—an 11,535-foot pinnacle just five miles to the north.

Mariscal Sucre has one runway, 17/35, that's 10,240 feet long and 151 feet wide. Nonprecision instrument approaches lead to runway 35 with missed approach points about five miles south of the airport, because of high terrain to the north. Landing to the south, visual approaches are flown through a valley to a modified left base.

Once on the ground, you'll find one parallel taxiway leading to crowded parking areas. The local SIDs don't comply with DOD terrain clearance criteria, so a careful look at climb performance is called for.

—Adapted from ISD-Q7-918

The final approach to runway 35 is over the city of Quito. Mountains in the background are about five miles away and reach 1,300 feet above field elevation.

On short final for 35. Note the lack of a paved overrun, no runway end markings and the runway upslope. The center line is temporarily displaced for construction.

Approaches to runway 17 are flown through this picturesque mountain valley.

C.R. TERROR

The Fraudulent April Fooler frustrates his crew by playing the cruelest joke of all.

Long Suffering Sam and Blinky both arrived early at squadron operations. Approaching the door, they grimaced at each other and nodded, acknowledging their mutual apprehension. After signing the latest FCIF in silence, the faithful navigator couldn't contain himself any longer, "It's just not fair, Sam, this makes two years in a row we've had to fly the April Fool trip with Major Terror."

"I know," replied the stalwart C-5 copilot, adding dejectedly, "but what can we do?"

"The boss is bad enough when he's normal, but on the first of April, it's . . . like a Dr. Jekyll and Mr. Hyde act. I didn't sleep a wink last night just thinking about it!" the red-eyed navigator stammered.

"Look at it this way," Sam offered with a glimmer of hope in his voice, "At least it's a short trip, with an RON tonight, and back home tomorrow. It will be all over by dinner time."

"Yeh, that's what I'm afraid of," Blinky muttered hopelessly.

"We'll have to really watch him close this year," Sam reminded, looking over his shoulder, a nervous twitch already developing in his left eye.

"Remember last year's April Fool flight to Howard and back," the disturbed Starshooter sputtered. "He said the flight snacks were all on him, and they turned out to be Mexican jumping beans. He nearly split his Nomex laughing at that trick!"

"And how about him giving poor Cyrus Cirrus a hot-foot during the weather briefing," recalled Sam, the twitching in his left eye becoming more pronounced.

"He really got a kick out of it," Blinky added, "rolling on the floor and laughing that the forecast called for an April Fools' heat

wave with a chance of lightning."

"I didn't mind the alum in the coffee as much as the bogus bogie check he had Howard tower make on our landing gear," Sam said accusingly. "I still think he just wanted an excuse to buzz the field. I'm glad nobody was hurt when the tower windows cracked."

"Everytime I think about that stalk of bananas he brought on board, I get a cold chill. He knew I had a fear of spiders when he began talking about the big ones that live in banana stalks. He also knew I didn't have anymore clean flight suits when he deliberately put that rubber tarantula on my shoulder. That was just too much," Blinky shuddered.

"He didn't give us any breaks on the trip home either," Sam said through clenched teeth. "He left me alone in the right seat and snuck back to the engineer's panel and pushed the fire warning test. Besides nearly having heart failure, I jumped so hard my inertial reel locked. He didn't quit, even when we got back home," Sam recalled, "radioing the command post that we had four generals on the airplane and doubling over laughing when he finally told the duty officer that he had four General Electric TF-39s on the wings—April Fool. The command post desk jockey certainly didn't see any humor in that, and neither did the protocol officer who met our airplane with two staff cars."

"He just doesn't know when to quit," added Blinky. The twitching twosome were becoming visibly more shaken with every incident they recalled.

"Yeh, we've got to protect ourselves this time," Sam said. "We can't believe anything he says, and anything he does may be a setup for one of his April Fool jokes. And be sure not to mention the date, that will only encourage him."

Just then the Magnificent Major bounded through the door. "Greetings my galloping Galaxy gaggle. Let us be away to base ops; I'll brief the mission particulars at the airplane. Got to make it to San Diego before the buffet line closes at Raul's Barrito Barn. Best Mexican food on the West Coast, ya know."

"Oh, hi Boss," Sam stuttered, trying to hide his obvious frazzled nerves and twitches, anticipating the Jocular Jokester's first prank.

"Boy, you both look like something the cat dragged home," C.R. laughed, scribbling his initials on the FCIF card.

The tense twosome stood staring blankly at each other as the Pudgy Prankster pranced out the door toward base operations.

"He's planning something big, I just know it," winced Blinky, clutching Sam's sleeve.

"Don't panic," soothed Sam, trying in vain to muster his best imitation of a cool copilot. "We'll just have to be on guard so when he strikes, it won't blow our minds like last year."

By the time the fretting flyers reached base ops, C.R. was deep in conversation with the new weather person, Lieutenant Windy Withers.

"And there I was at 35,000 feet with only one engine turning—and it was on fire," he was relating animatedly.

"Wow, major, how did you ever survive it?" the pulchritudinous prognosticator asked.

"Skill and cunning m'dear, skill and cunning. I'd be glad to give you a more detailed briefing tomorrow night if you happen to drop by the club for happy hour. I should be back from this top priority mission to the West Coast by then."

Before she could answer, Sam and Blinky stumbled into the weather room.

"Ah, there you are," the Rotund Reparteeist rebuffed gently, "just in time for the weather briefing. I've already taken the liberty of ordering our inflight consumables."

The fidgety flyboys looked at each other knowingly, then Sam blurted, "I forgot something, I'll be right back," winking at Blinky as he turned and ran out the door.

"What got into him?" C.R. mused. "And you, Blinky, you look like you were rode hard and put up wet, heh, heh."

Sam rejoined them in the command post where the august April Fooler was getting briefed at the window. "No Mexican jumping beans this time," Sam whispered. Blinky acknowledged with a shifty-eyed nod reminiscent of a spy movie.

Sam cleverly left the date off the flight plan until after the Corpulent Commodore signed it.

The unhinged underlings were in such a state of anxiety that half way to the airplane they remembered the nav kits and had to return to base ops for them. Then the crew bus made a quick pass at the aircraft and diverted to the squadron, because Sam had misplaced the trip kit.

"You two are acting mighty strange today," C.R. observed as

the crew bus finally pulled up to the waiting C-5. "You both get a demerit you can atone for by purchasing me Terrorific 'Tinis this very night."

Sergeant Ty Downs was resting at the foot of the crew ladder as C.R. bounded off the bus.

"Load's all on, sir, and it looks good," said the proficient purveyor of pallets.

"Great," replied C.R., "gonna try for an early go."

The two agitated aeronauts stumbled through their preflight duties while constantly looking over their shoulders in anticipation of C.R.'s April Fool escapades.

"Pilot, load," Sergeant Downs called on interphone. "How come in-flight just brought out 12 meals when we only have six crewmembers and no pax?"

"Beats me," The Mystified Manipulator replied, "I only ordered six."

Long Suffering Sam turned toward the nav table with a pained expression. With each possible April Fool opportunity not taken by the Ace of Aerospace, the perturbed pair became even more frustrated. It's like waiting for the other shoe to drop, Sam thought as he tried in vain to concentrate on the before-starting-engines checklist.

"Come on, Sammy m'lad, put the old brain in gear," lectured the Light-hearted Lothario. "Oh, bye-the-bye, did you double check Sergeant Torques' take off tabulations."

"Sorry, boss, it slipped my mind."

"That's two 'Tinis you owe me soon as we get to San Diego. Let's see, that's four from you so far, and Blinky owes me another one for telling Max it was okay to switch power before the inertial ball was completely wound up. Blinky must have had a trip or two with Colonel D. R. Error while I was on leave. And Sam, you must have had your annual simulator course with Hamilton Hand. Starting-engine checklist please, Sammy, that is if you can find it, heh, heh."

Once off terra-firma, the flight to Southern California was relatively uneventful, except for the noticeable nervousness of C.R.'s two cockpit companions.

The two up-tight aeronauts still believed that the Aviator with Avoirdupois had something up his sleeve. If only they could get on the ground without suffering a Terrorific trick. The descent and landing seemed to drag on for hours. When they finally pulled into the chocks, both Sam and Blinky breathed sighs of relief so audible that Sergeant Torque rechecked his pressurization system. Once on the crew bus at North Island and knowing that the Foxy Funster could not use April first as an excuse to further endanger their mental stability, they both began giggling uncontrollably.

"What gives with you two? Have you been breathing 100% nitrous oxide again?"

"Okay Boss, the relieved copilot blurted, you can go ahead and April Fool us all you want now that we're on the ground. Tomorrow will be April second, so we've made it."

"What do you mean?" C.R. asked, "Today is March 31st and tomorrow is April Fools' day. It says so right here on my brand new Cosmic Chronograph."

"Sorry boss, but we're sure it's April first," look at this newspaper," Blinky said, passing the bus driver's morning news to C.R. There it was in black and white—April 1.

"Well, what do ya know? There must have been an error in the programming of my chronographic computer," the Facetious Four-Flusher fessed, a sly smile forming on his chubby face. This cunning alteration of his physiognomy was not wasted on his fellow flyers. Sam looked at Blinky and said, tentatively, "Don't tell me this whole thing was a set up." The idea that they had just spent several hours April Fooling themselves without any help from their Merry Mentor was devastating.

The smile on C.R.'s face widened into a full Cheshire Cat grin as he said to the driver, "To the 'Q's' my good man. We need to clean up and head for the O'Club. I've got several drinks to collect from these two." And turning to the beleaguered bozos, C.R. bellylaughed, "April Fool, You all!"

Quick Stoppers

Galaxy Gets Hammered

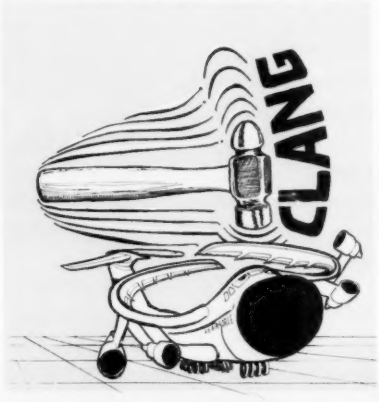
Many aircrewmembers may think that FOD is mostly a maintenance problem, but here's a very expensive mishap that involves both ground crews and flyers. The story starts when a maintenance man misplaced a hammer that he was using to help remove screws from the number two engine pylon. The consolidated-toolkit monitor noticed it was missing and wrote it up in the C-5's AFTO 781A—a grounding write up.

A five-man maintenance team searched in vain for the missing hammer. Convinced that the tool had been stolen, the maintenance supervisor signed off the red X.

The engines were then checked for foreign objects prior to running numbers one and four turbofans for maintenance checks. The engines were okay, and the C-5 was ready to fly the next day.

Apparently the hammer had slipped through an upper auxiliary air inlet door on the engine cowl, continued downward and lodged somewhere forward of the doors. It was effectively hidden from the aircrew during their preflight.

After takeoff the power was reduced and the aux inlet doors began to close. Nineteen minutes later the Galaxy's MADAR showed a possible fan vibration in number two engine. Increasing the N_1 setting brought the vibration within limits, so the crew decided to continue. Later during a climb to FL 260, the C-5's analyzer warned the crew of excessive vibrations in the number two fan. And again the crew delayed the decision to shut down the engine, because the core vibrations were within limits.



Seventeen minutes later, the MADAR alerted the crew to severe vibrations and they felt the throttles and airframe start to shake. During the descent to a lower altitude, the crew finally shut down the FODed engine—almost three hours after the MADAR gave the first indication of a problem.

The Galaxy crew thought that the MADAR system was giving faulty information. They erroneously believed that if engine vibrations were detected within the resonant range (80 percent) but were within limits at a higher power setting, the malfunction was more likely in the MADAR indicating system and the engine was really okay.

On the ground, investigators found the head of a ball-peen hammer between the inner and outer engine cowlings along with extensive damage inside of the TF-39.

Escambia Escapade

It's hard to imagine an experienced airline captain misreading his altimeter several times in a row during an approach, and it is even more difficult to fathom how his copilot could do the same thing right along with him. But they did, and it was the primary cause of a Boeing 727's fatal crash into Escambia Bay, Florida. Personifying Murphy's Law to the fullest, the crew also failed to monitor the jetliner's descent rate, and the first officer neglected to provide required altitude and approach performance calls. When the ground proximity warning system tried to do its duty, the flight engineer—erroneously thinking that the captain had asked him to do it—turned the device off because its noise made cockpit conversation difficult. (One might wonder what the conversation was about, since it is now painfully obvious there was very little communication or crew coordination going on related to the approach.) The radar controller even came in for a share of the blame in this fiasco because he didn't provide advance warning of the start-descent point, and thus needlessly accelerated the pace of the crew's cockpit activities after they passed the final approach fix.

Both the captain and the first officer told NTSB investigators that they misread their altimeters after being cleared from 1,700 feet. According to his testimony, the captain believed he saw 1,500 feet on the altimeter when the actual reading was 500 feet. As the hapless 727 continued to descend, the captain said he read 400 and 300 on his altimeter, "but in my mind I was thinking in terms of 1,400 and 1,300 feet." The board concluded that the captain "either misread or did not read, his altimeter" during the last stages of his approach. The subsequent crash three miles short of the runway and submergence of the airliner in 12 feet of water resulted in the deaths of three passengers. Forty-nine others, including the less-than-dynamic duo at the controls, were fortunately rescued by a barge that happened to be passing in the night.

For Want of a Meal

Next time you feel like passing up a chance to pack in some grits before going to fly—either as a passenger or a crewmember—think about the following episode.

On a stateside T-43A run between the midwest and the west coast, the stewards were passing out coffee when they came upon an enlisted passenger who appeared to be fast asleep. Although it was a bit early in the flight for someone to be zonked out—the Boeing bijet was just about to reach cruise altitude—they elected to let the sleeping sergeant lie, and pressed on with their rounds. At 33,000 feet, with a cabin altitude of seven-grand, another passenger notified the stewards that the soporific stripe wearer had awakened briefly, mumbled a few words, then promptly fainted. Quick as a flash, the hot cuppers administered 100 percent oxygen, placed the passed out passenger on the floor, loosened his clothes and removed his shoes. Even after these measures, the subject remained pale as a ghost, was sweating, and had an extremely weak pulse. Thinking that the victim was probably suffering from a heart attack, the stews continued administering oxygen, and treated him for shock.

In less than ten minutes the sarge regained consciousness, and was shortly deplaned in emergency status at an enroute base hospital for further examination and observation. Aside from nervousness, agitation, and the already noted sweating, no physical or mental abnormalities could be discovered. A history of the suddenly slumbering sergeant's normal activities—and particularly his routine in the 24 hours previous to the flight—revealed two interesting facts, however. As was his usual practice, he had consumed four or five drinks of hard liquor (although he was not visibly drunk when he boarded the airplane), but his only food intake during the 24 hours prior to flying was two bowls of soup. His poor eating habits, flight surgeons concluded, combined with the alcohol intake and resulted in hypoglycemia. The aggravation of even a 7,000-foot cabin altitude, which was perfectly normal for that flight, led to unconsciousness.

You can easily put yourself into this little drama as a crewmember by substituting similar or other debilitating factors such as an extended crew duty day, a harrowing flight with bad weather and/or airborne maintenance problems, starting to come down with a cold or flu, or perhaps an unusually happy session at happy hour during crew rest (even though it's within bottle/throttle tolerances), etc., etc. Couple any or a combination of these with a lack of proper nourishment prior to flying and you may just be setting yourself up for a serious physiological episode.

QS

CAVU...Except for

C.A.V.U. Ceiling and Visibility Unlimited. Pilot's ideal weather conditions. Occasionally, however, it deteriorates to conditions less than ideal in fog, rain, dust, haze, or smoke. But how about—feathers?!

An instructor pilot and his student were shooting multiple GCAs on a typical CAVU day at a southwestern airfield. After several conventional and otherwise routine radar approaches, the cockpit suddenly became IFR during climbout. The twin engine trainer had collided with a freshly and abundantly fed seagull! The gull struck the nose of the aircraft and became lodged in the heater air inlet duct, and the cockpit immediately filled with feathers and the odoriferous aroma of scorched fish and fowl. Despite the impairment caused by impact with the wayward gull, the crew managed to keep their wits about them and wrestled their own bird and the unexpected avian intruder back to the runway without further incident.

Adapted from *Approach*

Wine or Water

A celebration was planned in a remote little town one day, and to ensure there would be adequate liquid refreshments a great cask was constructed into which each citizen agreed to pour one bottle of his best wine. "If I fill my bottle with water," reasoned one, "the dilution will be so slight that nobody will even notice." But when the festivities started and the cask was tapped, the contents proved to be nothing except water. Everybody in the town had figured the same way, "My little bit won't be missed."

Of course this is only a fable, but let's compare it with flight safety. Every person is expected to contribute toward preventing accidents. They usually know how and why to do the job safely. They are fully aware of the terrible consequences that can result from accidents. Yet, there seem to be many people who have the same idea as the citizens of the village in the story above—"My little bit won't be missed." But like the contents of the wine cask, any flight safety program depends on the contributions made by everyone concerned. Changing the word "cask" to "task" we can easily see that each one who fails to contribute his little bit to the task of flight safety detracts that much from its effectiveness. Unfortunately, there are still some folks in all ranks "filling their bottles with water"—paying only lip service to flight safety. Accidents thrive on complacency, incompetence, lack of interest, absence of team spirit and general negligence. The moral? Show me an outfit where nobody contributes their bit to flight safety and I'll show you an outfit with a bunch of drunken winos.

—Adapted from the U.S. Naval Safety Center's *Weekly Summary*

Notable Quote

It has been said there are four groups of people:

1. Those that help make things happen.
2. Those that watch things happen.
3. Those that don't know things are happening.
4. Those that don't care what is happening.

What kind of people are you?

—W. Hanbury in *Mech*

After Deadline

T-SHIRT DELAY. Please, bear with us. The latest shipment of C.R. Terror T-shirts arrived in March, so it shouldn't be too long till we're able to reward the 1979 Writing Contest entrants. Incidently, if you neglected to include your T-shirt size with your contest story, give us a call so we can rush your T-shirt to you.

VFR "HOLES" CAN BE MADE by seeding cold fog--sometimes known as ice fog--with crushed dry ice. During Reforger '79, WC-130s seeded cold fog at several European locations-changing it to light snow and thereby creating temporary VMC for the launch and recovery of aircraft. This technique was developed and tested by AWS in the late 1960s. Now all we need is a way to dissipate thunderstorms!

SILVER ANNIVERSARY FLYER. June 1979 marks the 25th anniversary of TMF. C.R. Terror also celebrates his silver jubilee of service with MAC. If you have favorite art, articles or photos that you'd like to see again in the Flyer, let us know and we'll try to work them in.

A BIZJET AND A JET LINER nearly collided at LaGuardia last June due to a lack of coordination among ATC controllers, according to the NTSB. The crew of the Cessna Citation was on takeoff roll when a DC-9 was cleared to taxi onto "their" runway. Quick actions by the crewmembers avoided disaster. For more information on runway incursions, look for "The Primrose Path" in the May issue of The MAC Flyer.

AIRLIFT OPS SCHOOL STARTS CLASSES at Scott AFB this month with a test group of MAC staffers. The school's mission is to provide professional development for airlifters. The four-week program is open to officers, NCOs, and civilians, who have airlift management jobs that require a "big picture" look at MAC operations. AOS will also publish a quarterly journal, the Airlift Operations School Review, starting in October 1979.

THE SAGEBRUSH got to take a one-issue vacation this month on account of the pressing need for space to run a backlog of letters. He'll be back as iconoclastic as ever in May.

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I wonder what the weather is s'posed to be like for our trip today?